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October 22, 2002

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Subject: USNRC Docket No. 72-1014
HI-STORM 100 Certificate of Compliance 1014
One-Time Alternative to Codes and Standards for MPC-68 Serial Number 36

References: 1. Holtec Projects 5014 and 1108

Dear Sir:

Pursuant to the provisions of Section 3.3.2 of Appendix B to the HI-STORM 100 Certificate of Compliance (CoC), we hereby request NRC approval of a one-time alternative to the ASME Code, Section III, 1995 Edition with Addenda through 1997, for the fabrication of a certified component of the HI-STORM 100 System, MPC-68 Serial Number 36. The specific information supporting this request is provided below:

Background

HI-STORM FSAR Subsection 1.2.1.1 defines the MPC closure ring as part of the confinement boundary. Table 2.2.6 of the HI-STORM FSAR specifies that the MPC closure ring is classified as a Subsection NB component. Table 2.2.7 of the HI-STORM FSAR specifically states that material procurement of the confinement boundary shall meet AMSE Code Article NB-2000.

INPO Operating Event OE14229, "ASME Code Examinations Not Performed on Spent Fuel Storage Casks" was previously issued for certain spent fuel casks fabricated by another 10 CFR 72 certificate holder. The OE revealed that certain ASME Section III, Subsection NB components were not being inspected by the ultrasonic method (UT) as required by Article NB-2531 of the Code.

This OE was discussed on a subsequent telecon of the Holtec Users Group QA representatives. One licensee instructed their QC resident inspector to confirm that the proper inspections were being performed on the Holtec International casks currently under fabrication for use at their site. Upon review of the documentation packages for the MPC's, it was determined that MPC-68 serial number 36 was supplied with a closure ring that had not been UT examined in accordance with ASME Code, Paragraph NB-2531. MPC-68 serial number 36 is currently in service at the Independent Spent Fuel Storage Installation (ISFSI) at Exelon's Dresden Nuclear Station. This condition has been entered into the corrective action program at Holtec International.

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It was determined in conjunction with our affected licensee user that the appropriate course of action was to request a one-time alternative to the requirements of the ASME Code for this particular component to allow continued use of the closure ring as-is. The specifics of this request are contained in Attachment 1 to this letter, which details why this alternative provides an acceptable level of quality and safety for continued use of the component.

Approval of this one-time ASME Code alternative is necessary to complete corrective actions at Dresden Station and Holtec International. However, there is no impact on safe operations at the Dresden Station ISFSI. Therefore, we request approval of this one-time code alternative by January 31, 2003.

If you have any questions or require additional information, please contact the undersigned at (856) 797-0900, extension 668.

Sincerely,

Brian Gutherman, P.E.
Licensing Manager

Concurrence:

Manufacturing

10/22/02
Quality Assurance

emcc: Ms. Julia Barto, USNRC (with attachment)
Mr. Ken Ainger, Exelon Nuclear (with attachment)
Mr. Bernard Gilligan, Holtec (with attachment)

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ASME CODE ALTERNATIVE REQUEST

ASME Code Requirement

ASME Section III, Subsection NB, Paragraph NB-2531 requires all plates for vessels to be examined by the straight beam ultrasonic method in accordance with NB-2532.1.

Description of Alternative

A one-time alternative to not perform the straight beam UT examination required by ASME Paragraph NB-2531 for MPC-68 serial number 36 is requested.

Affected Component

The closure ring on MPC-68 serial number 36.

Justification for Alternative

The design functions of the MPC closure ring during storage under 10 CFR 72 are as follows:

1. The closure ring is part of the confinement boundary of the MPC for the HI-STORM 100 System. It provides a redundant welded boundary to the primary confinement boundary. As such, it is designed to contain the MPC internal pressure should the MPC lid-to-shell or vent/drain port cover plate welds fail.

2. The closure ring also provides a small measure of shielding at 3/8-inch nominal thickness, which is credited in the shielding analyses.

The HI-STORM FSAR makes the following commitments with respect to the MPC closure ring:

1. The closure ring is classified as ITS-A (Table 2.2.6).

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2. The closure ring is part of the confinement boundary (Table 1.0.1 definition of "Confinement Boundary"; Section 1.2.1.1; Section 2.2.2.4; Section 2.3.2.1; Section 3.1.1; Section 7.1; Section 7.2.1).

3. While the closure ring is not normally pressure-retaining, it is conservatively designed as part of the enclosure vessel, which is a pressure vessel (Table 1.0.1 definition of "Enclosure Vessel").

4. The closure ring provides shielding (Section 1.2.1.3).

5. The closure ring provides redundant closure of the MPC lid and cover plate confinement welds (Section 1.2.2.2; Table 2.0.1; Section 2.3.2.1; Section 7.1.1; Section 7.2.1; Section 7.2.3; Section 8.1.1; Section 11.1.3).

6. The applicable ASME III Subsection for the closure ring is NB (Table 2.2.6; Section 7.1.1).

7. The closure ring shall be inspected in accordance with NB-2500 (Section 9.1.1).

8. The closure ring protects the MPC lid-to-shell weld from the environment (Section 9.1.1.1).

9. The closure ring meets ASME Code allowables under design MPC internal pressure of 100 psig (Appendix 3.E of HI-STAR FSAR).

10. The closure ring is fabricated from Alloy X (Section 1.5).

All regulatory commitments except items 6 and 7 are fully complied with for the closure ring delivered with MPC-68 serial number 36.

Each design function of the closure ring is addressed with respect to the ability of the closure ring to continue to meet its design function without the UT inspection.

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Confinement:

The MPC closure ring provides a redundant welded closure for the primary confinement boundary, which is comprised of the MPC lid, vent and drain port cover plates, and associated welds. Therefore, the closure ring would only be exposed to the internal MPC pressure if the MPC lid, cover plates, or associated welds fail. The closure ring is not normally pressure retaining nor will it experience internal pressure under any off-normal or accident condition of storage since the underlying port cover plate welds and MPC lid-to-shell weld are designed to maintain integrity under all design basis loads.

The sole deviation of the 3/8" thick austenitic stainless steel material used for the MPC closure ring is the omission of a straight beam UT inspection as required by NB-2531. The ASME Code requires straight beam inspection for vessels because the predominant indication in plates is laminations. Straight beam inspection cannot detect indications perpendicular to the surface of the plate. With respect to maintaining confinement, an indication perpendicular to the surface of the plate is the most critical. Laminations in the plate parallel to the surface of the plate cannot cause leakage through the plate. Therefore, the straight beam UT inspection does not add any value for detecting a defect in the thin closure ring with respect to its confinement function.

It is highly unlikely that 3/8" thick austenitic stainless steel would have indications beyond the UT acceptance criteria. Holtec's experience with previous procurements that required UT examination for 3/8" thick, SA240 304 plate for the vent and drain port cover plates and closure rings is that this material *rarely* fails this UT examination. The MPC-68 serial number 36 closure ring was fabricated from heat number 893771. Holtec International has successfully performed the required UT examination on over 10,000 square inches of this same heat of material.

In those instances where indications are found in plates, they are laminations parallel to the plate surface. Very large laminations that could adversely affect the operation of the component would be detected during the fabrication of the component (i.e., burning of the plate to form the closure ring, machining of the closure ring to clean up the burned edges, or final visual inspection for dimensions). Additionally, laminations near the edges of the closure ring would be discovered during the liquid penetrant examination of the closure ring welds (closure ring-to-MPC shell, closure ring-to-MPC lid, and closure ring piece-to-closure ring piece). No laminations near the edges of this closure ring were found during these PT examinations when serial number 36 was loaded at Dresden Station.

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The closure ring without the UT inspection continues to meet the confinement requirements because the material has been confirmed to comply with the applicable requirements of ASME Section II SA240 for Type 304 stainless steel and, as such, continues to maintain the redundant barrier of the confinement boundary and to protect the primary confinement boundary field welds from the environment.

Structural:

Other than the omission of the UT examination, the material used for the MPC closure ring complies fully with the requirements of ASME Section II SA240 for Type 304 stainless steel. Therefore, all of the mechanical and chemical properties remain in compliance with the ASME Code and the safety factors in the FSARs are unaffected.

As shown in the HI-STAR FSAR Rev. 0, Appendix 3.E, Section 3.E.8.5, the margin of safety of the MPC closure ring is 0.405 assuming an internal pressure of 100 psig. This conservatively assumes that the closure ring is simply supported.

However, even if laminations or other indications are assumed to exist in the closure ring, it can be asserted that there is no mechanism for such indications to propagate. Austenitic stainless alloys are universally recognized as having excellent fracture toughness. The crack propagation mechanism in austenitic stainless steel is principally connected with stress corrosion cracking (both transgranular and intergranular), which requires that both stress (tensile) and an inimical environment (oxygen and halides) be present. As the closure ring is the redundant confinement boundary, it is not normally pressure-retaining or under any stress unless the MPC lid, cover plates, or associated welds fail. Likewise, other classical flaw propagation mechanisms, namely hydrogen embrittlement and cyclic fatigue, do not have credible underlying actuators with respect to the closure ring and cover plate. Hydrogen embrittlement is a result of welding, which has not been adversely affected by the lack of UT inspection. In addition, the closure ring is exposed to only minor cyclical loadings.

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The MPC internal pressure is largely a function of the initial helium backfill pressure and the fuel assembly decay heat load. The decay heat from the fuel heats up the helium causing the MPC internal pressure to increase. The decay heat load slowly reduces over years and, therefore, does not contribute to a cyclical loading. By way of comparison, it is noted that the MPC lid-to-shell weld is subject to much greater stress levels (see Holtec Position Paper DS-213, reviewed by the NRC), yet the weld was qualified with a 3/8" wide weld flaw. The thickness of the closure ring is only 3/8".

Shielding:

The material used for the MPC closure ring complies fully with the requirements of ASME Section II SA240 for Type 304. Therefore, the properties used in the shielding analyses (i.e., density) remain unchanged and the dose rates reported in the FSAR are unaffected.

Summary:

Based on the material type and size, it is unlikely that the UT examination would have discovered flaws previously undetected during the manufacturing of the plate or subsequent visual inspections. In addition, Holtec International has successfully performed the required UT examination on more than 10,000 square inches of this same heat of material with other components, without identification of any adverse (laminar) indications. As such, there is high confidence that, although the closure ring did not have a UT inspection, it continues to meet the structural requirements and will continue to perform its design function. The omission of the UT inspection has no adverse impact on the shielding effectiveness of the closure ring.

This evaluation demonstrates that the closure ring on MPC-68 serial number 36 has an acceptable level of quality and safety.